THE RADICAL TREATMENT OF CARCINOMA OF THE BLADDER.

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THE percentage of ultimate cures effected by the various radical operations for carcinoma of the urinary bladder is very small and does not bear favorable comparison with that which is achieved in the radical treatment of carcinoma of other organs. These bad results are partly owing to the complicated problems we are called upon to meet in dealing with malignant neoplasms of this viscus, and partly to the fact that we have neglected to fully appreciate certain facts in the pathology of this disease.

The radical operative cure of a malignant tumor, according to our present conception, demands a wide removal of the primarily diseased tissue and of the secondarily affected lymphatics and glands. When malignant deposits have extended beyond the immediate local glandular apparatus or have appeared in distant organs, the idea of a radical extirpation of the disease can no longer be entertained. It is surprising how these axiomatic principles for the radical cure of malignant tumors are constantly ignored in cases of malignant growths of the urinary bladder. Thus it has been, and still is, the common practice to entirely ignore the lymphatics and glands in the radical operation for cancer of this viscus, owing possibly to the idea that these structures are usually not affected. This supposition, however, is entirely erroneous. In the very early stages of the malignant growth, when the neoplasm is confined to the mucosa and is not ulcerated, the lymphatics and glands usually show no malignant changes, but as soon as the tumor invades and infiltrates the muscular coats of the bladder the spread to the lymphatics and glands

takes place, and no operation can be a radical one that does not include a wide removal of these latter structures. In 56 cases of infiltrating cancer of the bladder collected by Guyon, glandular enlargement was positively recorded in 15, and in the other 41 no mention was made as to whether the glands were or were not involved.

In a previous communication the writer called attention to the necessity of a wide removal of all infected sacral and iliac glands and described the technic for their extirpation. (ANNALS OF SURGERY, 1904, vol. 40, 382.)

Another consideration of vast importance has only recently been called to our attention by Dr. F. Mandlebaum in his admirable study of "New Growths of the Bladder," published in Surgery and Gynecology, V, 315, 1907. In 1870, Klebs (Handb. d. Path. Anat.) announced his view that carcinomata of the bladder are always secondary to primary deposits in the prostate, rectum, or uterus, and that in women at least a primary tumor of the bladder cannot be cancerous. This opinion was combatted by the school of Necker and defended again by Motz and Monfort. The importance of this point is very evident. If Klebs is right, then in the male subject the removal of the prostate is essential to every radical operation for bladder cancer. Mandlebaum carefully studied this particular question. He found that the papillary and the flat or squamous-celled carcinomata do occur as primary tumors in the bladder, but that the fibro- or scirrhus-carcinomata, and the adenocarcinomata are very often, if not always, secondary to primary tumors of the prostate, uterus, or rectum. Thus he had in his collection of cases five of fibro- or scirrhus-carcinomata. In these patients a clinical diagnosis of primary malignant tumor of the bladder was made, because a careful physical examination of the prostate and rectum had failed to reveal any evidence of malignant trouble in these organs. Yet a close study of the extirpated tumors and a postmortem examination in two of the patients revealed the fact that in four of the cases the neoplasm was primary in the prostate and secondary in the bladder. He

made a similar observation in two cases of apparent primary adenocarcinoma. In these two patients a postmortem examination showed that the prostate was the primary focus of disease, though no evidence thereof was furnished by a careful physical examination during life.

If the conclusions reached by Dr. Mandlebaum are confirmed by further investigation, their bearing upon the surgical aspects of vesical carcinomata will be very great. They teach us first of all not to rely upon the evidence furnished by physical examination in forming our opinion as to the existence of a malignant tumor in the prostate. Secondly, they demonstrate the great importance of knowing the exact histological character of every malignant tumor of the bladder before proceeding to its radical removal; for of what use is it to extirpate a part or the whole of the bladder if thereby is removed only a secondary deposit, while the primary growth in the prostate, uterus, or rectum is left unmolested? If the adeno- and scirrhus-carcinomata are found to be always secondary tumors, then the radical operation for their cure must include a wide removal of the primarily diseased part. In the light of Dr. Mandlebaum's investigations, the writer does not doubt that many recurrences after radical operations for vesical cancer are due to the fact that an unrecognized primary focus of malignant disease in the prostate, uterus, or rectum was left behind at the time of the operation, and he is convinced that attention to the facts brought out by Dr. Mandlebaum will better our percentages of ultimate cures of this malady.

With these preliminary remarks on the pathology of vesical carcinomata and the bearing they have upon the extent of operative procedures undertaken for their radical cure, we come to consider how best to deal with the neoplasm; and here the operator must give his attention not only how to widely remove the tumor, but also how to restore or substitute for the function of a urinary reservoir which the bladder serves.

This latter fact complicates the problem very much and has been and still is the subject of much discussion. If the

reservoir function of the bladder could be entirely dispensed with or satisfactorily and safely replaced or substituted for in some manner, a vesical carcinoma could be dealt with much as is a carcinoma of the gall-bladder, namely, by complete excision of the affected organ; but thus far all our experience has not succeeded in demonstrating how to so safely replace or substitute for this urinary function of the bladder. The use of the rectum, vagina, or partly excluded loop of intestine, *e.g.*, the sigmoid flexure or small intestine, as a substitute for the bladder, has been mostly abandoned because of the danger entailed thereby of an infection from these viscera ascending the ureters to the kidneys, with consequent pyelonephritis and death. Similarly, the doing away altogether with a urinary reservoir by implanting the ureters onto the skin of the abdomen or loin, or by direct drainage of the kidney-pelvis through the loin (double nephrostomy) exposes the kidneys to the same dangers of infection, and places additional worry, annoyance, and discomfort upon the patient in the attention and care that must be expended upon the toilet of the urinary fistulæ.

Our ineffectual efforts to provide a satisfactory substitute for the reservoir function of the bladder or to safely and conveniently do away with it altogether make it very desirable in the radical operations for vesical cancer to preserve enough of the bladder to act as a urinary reservoir, provided this is consistent with the requirements of a radical extirpation of the disease. This desideratum at once brings up the following questions:

1. Is it possible to effect a lasting and permanent cure of a vesical carcinoma by a partial resection of its wall, or is it necessary in every case to completely excise the viscus?

2. In case partial resection is consistent with the requirements of a radical extirpation, how much bladder wall must be left in order to make a satisfactory urinary reservoir?

As regards the first of these questions,—viz., is it possible to effect a lasting cure of a carcinoma of the bladder by a partial resection of its wall, or is it necessary in every case

to completely excise the viscus?—Rafin, in his masterly monograph on Tumors of the Bladder, published in Compte rendu de l'association française d'nrologie for 1905, gives the results of 96 partial cystectomies for carcinoma. These cases were collected from literature and by personal communication with those in charge of large hospital services. Of these 96 cases, 21 died from the operation, and 25 could not be subsequently traced. Of the remaining 50,

1 was well after 3 years.
1 was well after 3 years and 4 months.
1 was well after 4 years.
1 was well after 5 years.
1 was well after 6 years.
16 were well at periods ranging from 6 months to 2 years.

Twenty-one of the fifty then were living without recurrence at periods varying from six months to six years, and five had passed the three-year limit. In view of these reports there cannot be any doubt of the possibility of radical cure by partial resection of the bladder.

It is true that the immediate mortality of the operation in the cases reported by Rafin is very high—21+ per cent.—and that the number of permanent cures is very small; but the fact is clearly demonstrated that by partial cystectomy a radical cure can be effected, and it is only reasonable to assume that with improved technique the operative mortality will be less, and that with earlier recognition of the disease and attention to the pathological facts already mentioned, the number of permanent cures will be much increased.

Watson, however, from an extended study of the cases reported in literature, takes a different view from that just expressed. He holds that the chief causes for the high mortality attending operations for vesical carcinoma and for their frequent recurrence seem to be in the failure to operate soon enough and radically enough. To quote his emphasized statement: "The very large percentage of recurrence seems to point logically to the necessity of more radical measures in

benign as well as in cases of malignant tumors, if we are to hope for better results. The suggestion I have to make in this report is that total extirpation of the bladder and of the prostate, if it be involved in the pathological process, be done at the outset in all cases of carcinoma that have not extended beyond the above named structures and in which it is believed that there are no metastases; and that the same measure be applied in all cases of benign growths in which recurrence has taken place after a primary operation for their removal."

He goes on to say that ureteral implantation which contributes, as it seems, to the surgical failures, should be abandoned, and *lumbar nephrostomy,* with ligation of the ureters done instead, and at some time previous to the operation for the removal of the tumor, as it seems to offer a much safer and less objectionable way of disposing of the most difficult part of the latter operation.

It is important that we consider in detail these statements of Dr. Watson, which have for their foundation not his own acute clinical observation and personal experience, but merely the records of cases reported in the literature.

In this consideration it is necessary first of all to compare the immediate and late results after partial and complete cystectomy. Rafin collected 30 cases of total excision of the bladder for carcinoma. In 17 of these there was a fatal issue to the operation, *i.e.,* a mortality of 56.5 per cent. Five of the surviving cases could not be traced; in 3 death occurred from kidney complications, 4 months, 13 months, and 5½ years respectively, after operation; and 3 were well 7 months, 15 months, and 5 years respectively, after operation. These results compare most unfavorably with those obtained after partial cystectomy, for in the latter the immediate mortality was much lower—21 out of 96 cases, *i.e.,* 21+ per cent., and the ultimate results were better, inasmuch as 21 out of 50 cases were known to be well and free from recurrence at periods varying from six months to six years after operation.

Of the 17 immediate operative deaths after complete

cystectomy in the series collected by Rafin, 9 were from renal causes, and it is possible that some of these might have been averted by a preliminary lumbar nephrostomy, as suggested by Watson. The latter author is in favor of complete extirpation for two reasons: (1) the dangers of recurrence after partial cystectomy, and (2) the dangers of ascending infection to the kidneys resulting from ureteral implantation into the bowel or vagina or on to the skin of the loin or abdomen. In answer to these objections to partial cystectomies it is to be noted that the percentage of recurrence after total extirpation of the bladder is almost as high as in those who survive the partial extirpation. Of Watson's 25 collected cases of complete extirpation, 11 survived, and of these only 2 were alive and free from recurrence after three years; 1, three years, and 1, eight years, respectively; whereas, of Rafin's 96 cases of partial cystectomy, the 50 that survived and could be traced, included 5 that had safely passed the three-year limit without recurrence.

As regards this question of recurrence, it is the writer's opinion that the dangers thereof are not materially dependent upon whether a complete or partial cystectomy be done, provided, of course, that the disease is widely extirpated; but that they are dependent, as stated in a preceding portion of this paper, first, upon whether all the cancer-infected glands and lymphatics are simultaneously removed with the primary tumor; and, secondly, upon whether, when the primary neoplasm is in the prostate, uterus, or rectum, these affected parts are likewise removed, together with the vesical tumor.

In other words, the writer thinks that where the carcinoma is primary in the bladder and limited to one part thereof, a wide removal of the neoplasm (partial cystectomy), together with all the lymphatics and glands, will afford as sure a protection from recurrence as will a complete extirpation of the organ.

In reference to the proposal that a preliminary bilateral lumbar nephrostomy with ligation of the ureters should replace ureteral implantation into the intestine or vagina, or onto

the skin of the abdomen or loin, Watson urges that the time of operation would be thereby shortened; that liability to kidney infection would be much less; and that the procedure supplies immediate and sufficient drainage from the kidney and is the best means for giving prompt relief to renal retention.

These arguments can apply *prima facie* only to complete extirpation with ureteral implantation into the intestine, or vagina or onto the skin, as against complete extirpation with preliminary lumbar nephrostomy, and not as against partial cystectomy with ureteral *re*implantation into the bladder; for in the first place the danger of ascending kidney infection through a ureter that has been reimplanted into a remaining normal part of the bladder is not greater than that after a lumbar nephrostomy. In fact, it would seem, judging from the writer's experience with this latter procedure done for other causes—*i.e.*, persistent hæmaturia, stone, etc., that some infection of the kidney pelvis always results therefrom.

Watson furthermore estimates the mortality resulting from ureteral implantation into the intestine, vagina, or skin, as being much higher than that resulting from direct lumbar nephrostomy. Of this there is no question. But we must not confuse the dangers of ureteral implantation into an infected viscus with the dangers resulting from ureteral reimplantation into the bladder, as is the case when a partial cystectomy is done. According to Watson's own figures, the operation of nephrostomy done for any and all causes is 15 per cent. Surely if we are to accept this figure as pertinent to nephrostomy done as a preliminary procedure to a radical operation for bladder carcinoma, we must acknowledge that for a preliminary step the mortality is inordinately high, and we could scarcely be expected to enter heartily into any proposal that promises so large a percentage of deaths before we even commence a radical cure of the disease itself. As a matter of fact, however, the writer does not believe that a preliminary nephrostomy—when the kidneys are comparatively healthy—

has anything like so high a mortality as 15 per cent., and surely ureteral reimplantation into a healthy part of the bladder, done according to the modern improved technic, as will be later described, is not attended with anything like 15 per cent. of immediate operative deaths.

As to the comparative dangers of infection of the kidney after bilateral nephrostomy and ureteral reimplantation into a healthy bladder, there are no reliable figures or extended clinical experiences upon which we can at present base conclusions. There are instances of late infection of the kidney pelves after lumbar nephrostomy as well as after ureteral reimplantation into the bladder, and only continued trial of the two procedures will demonstrate in which of them the dangers of late kidney infection is the greater.

Watson further dwells on the advantages of lumbar nephrostomy in case the kidneys are already infected. In such cases the good effect of drainage of the kidney pelves cannot be questioned, but surely one cannot contemplate a radical operation for the bladder cancer under such conditions. In patients with this complication, radical operations have no place—only palliative procedures are to be considered in them.

Furthermore, there are serious objections to a general use of lumbar nephrostomy in operation for bladder tumors. The proper care of such urinary fistulæ is possible only by the highly intelligent and cleanly who can be taught the principles of asepsis, and by those who do not have to engage in hard manual toil. In all others the dangers of kidney infection are much greater, and the wearing of an apparatus such as is described by Watson is hardly consistent with the occupation of mechanics or laborers.

Taking into consideration then all the facts: first, that the freedom of recurrence after partial cystectomy is as great as that secured by complete extirpation; secondly, that the immediate operative mortality after partial cystectomy is not half as high as that after entire removal of the bladder; thirdly, that the objections raised by Watson to ureteral implantation into the intestine, vagina or skin do not maintain

to ureteral reimplantation into a remaining healthy portion of the bladder, the writer is forced to the conclusion that when we have to deal with growths limited to a third of the bladder, and especially when their site is on the fundus and lateral walls, *partial cystectomy with reimplantation of the ureter into the remaining portion of the bladder when the ureteral orifice is involved in the disease is by far the operation of choice.*

It must not be inferred, however, that total extirpation has no place in our consideration of the radical cure of this disease, for when the cancer is diffusely spread over the greater part of the bladder, thus forbidding us to save a sufficient portion thereof to form a reservoir for the urine, or when there is a bad cystitis that does not yield immediately to therapeutic measures and which necessarily increases materially the dangers of ascending ureteral infection after reimplantation of the ureters, then complete extirpation is advisable provided the patient is otherwise sound.

The preliminary operation of lumbar nephrostomy would certainly seem to be indicated when complete excision is done.

In reference to the second question that I have proposed in connection with partial cystectomy, viz., how much bladder wall must be left to form a satisfactory reservoir for the urine?—there are no reports in the literature bearing upon this point. The writer in one case removed slightly more than one-half of the bladder, and the remaining portion performed the function of a reservoir very well. The patient could hold his urine easily for three hours; he had to get up twice at night to urinate, and was very comfortable. In his three other cases about one-third of the bladder wall was removed. In two of these latter that survived the operation the remaining portion of the bladder functionated excellently as a reservoir, the patients being able to hold their urine almost as well as in their healthy state. In the light of these experiences the writer would say that one should be able to remove fully one-half of the bladder without materially interfering with the function of this organ, and that the removal of a third

of the viscus does not have any appreciable effect upon the function of the remaining portion.

A few words in reference to the technic of partial cystectomy as done by the writer and described by him in ANNALS OF SURGERY, 1904, vol. 40. A median incision is made above the symphysis or a lateral one at the outer margin of either rectus muscle, depending upon the location of the tumor in the bladder as previously determined by the cystoscope. This incision is deepened down to the peritoneum, which latter is then stripped back from the pelvis and from the bladder. If the tumor occupies the peritoneal surface of the bladder the affected part of this membrane will likewise have to be removed. The peritoneal cavity is therefore best opened in such cases at once and the intestines protected with warm pads. With the patient in Trendelenburg's position search is made for glandular enlargement along the course of the internal iliac artery and in the concavity of the sacrum. When such glands are present, they are carefully removed, together with the surrounding fat. Such glandular enlargement must be sought for up to the bifurcation of the common iliac artery and along the promontory of the sacrum. During this procedure there is sometimes considerable oozing from the rich venous plexuses in the pelvic cellular tissues, but this can always be controlled by pressure with gauze or sponges. The ureter corresponding to the affected side of the bladder is now located and dissected out down to its entrance into this viscus, and the pelvic space is carefully lined with iodoform gauze so as to prevent its infection during subsequent manipulations. The bladder is opened in healthy tissues to one side of or above the tumor, and the surface of the neoplasm at once cauterized with the actual cautery or pure carbolic acid. I deem it the better plan to remove the neoplasm after the bladder has been opened, working from the interior outward, rather than to excise the tumor mass from without inward, for with the limits of the neoplasm directly visible it is possible to make a wider resection into healthy tissue. If the neoplasm is found to involve the lower end of the ureter, this is divided

in healthy tissue and the proximal end temporarily closed with a seraphin to prevent leakage of urine over the field of operation. The stump of the ureter is then reimplanted into the *vertex* of the *bladder.*

This reimplantation into the vertex, as against reimplantation into the base of the bladder at the site previously occupied by the neoplasm, is important for the following reasons: In the first place, if the ureter is implanted into the bladder at the site from whence the neoplasm has been removed, it will be very difficult to effect an impervious junction, and furthermore, inasmuch as at this site there is likely to be some marginal necrosis, the liability of ascending infection from such necrosis along the ureter to the kidney is very much increased. The defect in the bladder caused by the removal of the neoplasm is now closed with two layers of sutures, one a catgut Connell suture passing through all the walls of the viscus, and the other an external mattress suture of fine silk going through only the muscular coats. I have found it sufficient to drain the bladder through the urethra, but if deemed necessary a suprapubic opening for drainage may be established. It is very essential to provide liberal gauze drainage of the cellular tissues in the pelvis, always, however, taking the precaution to place a strip of rubber tissue between the suture line in the bladder and the gauze. The bladder drainage is removed after six days and the patient is permitted to pass his urine spontaneously. Frequent washings of the bladder at this time will relieve the cystitis resulting from the operative manipulations.

Thus far the writer has had occasion to practice this operation four times. In two of the cases the growth in the bladder was secondary to extensive uterine carcinomata, one of the patients being a young woman with extensive vaginal, uterine and broad ligament carcinoma, in whom radical operation was undertaken only because of the extreme youth of the patient and at the earnest solicitation of her friends and relatives. In one of these patients there was a recurrence of the malady in the pelvis a year and a half after operation, and in

the other evidences of returning carcinoma appeared after six months. Neither case was a favorable one for radical cure. As regards the bladder complication, although one-third of this organ had been removed and the ureter reimplanted into the bladder, the patient was able to hold the urine almost as well as in her normal state.

In a third patient the bladder cancer appeared to be favorable for operation. There was noted in the prostate before operation a nodule about the size of a small hazelnut which was not, however, thought to be malignant. The neoplasm in the bladder about the size of a silver half dollar and of a squamous-celled type, together with the terminal half inch of the left ureter was removed, according to the method described above, and the ureter was reimplanted into the vertex of the bladder. An uninterrupted convalescence took place. The wounds were completely closed at the end of four weeks, the patient had perfectly normal bladder function, and remained well for fourteen months after the operation. He then showed evidences of prostatic enlargement, and on examination it was found that the previously described nodule in the organ had increased very considerably in size and was hard and fixed. The removal of this nodule was deemed inadvisable and the patient succumbed to a prostatic cancer somewhat more than a year later, a little over two years after the operation. In this case the bladder tumor was probably secondary to the prostate cancer, and the prostate should have been removed together with the bladder tumor.

The fourth patient was a favorable one for radical operation. He had a tumor about the size of a silver half dollar occupying the right side of the bladder and the right ureteral orifice, was in good physical condition, and about 58 years of age. The lymphatic glands and bladder tumor were removed in the usual manner, but I deviated from my usual practice of reimplanting the ureter into the vertex of the bladder and followed the suggestion made by a colleague of making the ureteral implantation into the base of the bladder at the site occupied by the neoplasm. All went well until the sixth

day, when there were evidences of septic infection, a pneumonia developed at the base of the lung, and the patient succumbed three days later. At the autopsy it was found that there had been a leakage of a few drops of urine at the site of the ureteral junction and that there had been an ascending infection of the pelvis of the right kidney, which contained a few drops of pus. Whether this last mentioned condition or the pneumonia was the cause of death it is, of course, difficult to say, but the fallacy of reimplanting the ureter into the base of the bladder was well demonstrated, and in subsequent cases I should certainly not select this site for reimplantation. Unfortunately the writer was not aware that Albarran and Rafin have had the same experience with reimplantation of the ureter at the base of the bladder. They likewise have come to the conclusion that in partial cystectomy involving the ureteral orifice it is far more advisable to reimplant the ureter into the vertex than into the base of the bladder.

Simple removal of a cancerous tumor from the bladder, either by the curette or knife or actual cautery through a suprapubic opening without partial or complete cystectomy, has not been considered in this paper amongst the radical operations for this disease, although there are cases in the literature of a permanent cure having been accomplished in this way. Such instances are very rare and a lasting cure by an operation of this kind is possible only when the tumor is a pedunculated one and its base not infiltrated with malignant disease.